

Amendments to the Claims

1-27. (cancelled)

28. (currently amended) A semiconductor device having one or more air gaps therein produced in accordance with a the method of claim 1 comprising the steps of:

(i) using a sacrificial material to occupy a closed interior volume in a semiconductor structure;

(ii) causing the sacrificial material to decompose into one or more gaseous decomposition products; and

(iii) removing at least one of the one or more gaseous decomposition products by passage through at least one solid layer contiguous to the interior volume, wherein the decomposition of the sacrificial material leaves an air gap at the closed interior volume previously occupied thereby, and the sacrificial material comprises a polymer composition selected from one or more polycarbonate polymers, polyester polymers, polyether polymers, methacrylate polymers, acrylate polymers, or mixtures thereof.

29. (currently amended) A semiconductor device having at least one air gap therein comprising:

a substrate;

at least one conductive line or lead;

at least one air gap; and

an overcoat layer,

wherein the at least one air gap is produced in accordance with a the method of claim 17 comprising the steps of:

(I) forming a patterned layer of sacrificial material on a substrate corresponding to a pattern of one or more gaps to be formed in the semiconductor structure;

(II) depositing a second material on the substrate within regions bordered by the sacrificial material;

(III) forming an overcoat layer of material overlying the patterned layer of sacrificial material and second material in the regions bordered by the sacrificial material;

(IV) causing the sacrificial material to decompose into one or more gaseous decomposition products; and

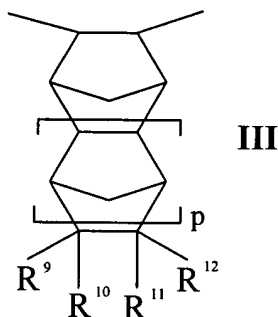
(V) removing at least one of the one or more gaseous decomposition products by passage through the overcoat layer so that one or more air gaps are formed within the semiconductor structure,

wherein the sacrificial material is a polymer composition selected from one or more polycarbonate polymers, polyester polymers, polyether polymers, methacrylate polymers, acrylate polymers, or mixtures thereof.

30. (original) The semiconductor device of claim 29, wherein the at least one air gap has a height which exceeds the height of an adjacent conductive line or lead.

31-38. (cancelled)

39. (currently amended) The semiconductor device as set forth in claim 52 34, wherein the norbornene polymer comprises repeating units represented by Formula III below:



wherein R^9 to R^{12} independently represent a polar substituent selected from the group:

$-(A)_n-C(O)OR''$, $-(A)_n-OR''$, $-(A)_n-OC(O)R''$, $-(A)_n-OC(O)OR''$, $-(A)_n-C(O)R''$,
 $-(A)_n-OC(O)C(O)OR''$, $-(A)_n-O-A'-C(O)OR''$, $-(A)_n-OC(O)-A'-C(O)OR''$,
 $-(A)_n-C(O)O-A'-C(O)OR''$, $-(A)_n-C(O)-A'-OR''$, $-(A)_n-C(O)O-A'-OC(O)OR''$,
 $-(A)_n-C(O)O-A'-O-A'-C(O)OR''$, $-(A)_n-C(O)O-A'-OC(O)C(O)OR''$,

$-(A)_n-C(R'')_2CH(R'')(C(O)OR'')$, and $-(A)_n-C(R'')_2CH(C(O)OR'')_2$; p is 0, 1, 2, 3, 4, or 5; the moieties A and A' independently represent a divalent bridging or spacer group selected from divalent hydrocarbon groups, divalent cyclic hydrocarbon groups, divalent oxygen containing groups, and divalent cyclic ethers and cyclic diethers; and n is an integer 0 or 1.

40-51. (cancelled)

52. (currently amended) A semiconductor device having one or more air gaps therein produced in accordance with a the method of claim 34 comprising the steps of:

using at least one sacrificial material to occupy simultaneously or sequentially at least two closed interior volumes in a semiconductor structure, wherein the at least two closed interior volumes are on different levels of the semiconductor structure;

causing the at least one sacrificial material occupying the at least two closed interior volumes to decompose either simultaneously or sequentially into one or more gaseous decomposition products; and

removing at least one of the one or more gaseous decomposition products by passage through at least one solid layer contiguous to the interior volume.

53-70. (cancelled)

71. (currently amended) A semiconductor device having one or more air gaps therein produced in accordance with a the method of claim 55 comprising the steps of:

using a sacrificial material to occupy at least one first closed interior volume in a semiconductor structure and using a conductive material to occupy at least one second closed interior volume in a semiconductor structure, the at least one first closed interior volume and the at least one second closed interior volume defining at least one gap therebetween;

forming an overcoat layer of material on the sacrificial material and the conductive material with the overcoat material extending into the at least one gap;

causing the sacrificial material to decompose into one or more gaseous decomposition products; and

removing at least one of the one or more gaseous decomposition products by passage through the first overcoat layer so that one or more air gaps are formed within the semiconductor structure, thereby yielding overcoated conductive structures.

72. (original) A semiconductor structure comprising:
a substrate;
a sacrificial material supported on the substrate;
a conductive material supported on the substrate and spaced apart from the sacrificial material;
an overcoat layer overcoating the sacrificial material and the conductive material and extending into the one or more spaces between the sacrificial material and the conductive material.

73. (original) The semiconductor structure of claim 72, wherein the sacrificial material is selected from one or more norbornene polymers, polycarbonate polymers, polyester polymers, polyether polymers, methacrylate polymers, acrylate polymers, or mixtures thereof.

74. (original) The semiconductor structure of claim 72, wherein the height of the sacrificial material exceeds the height of the conductive material.

75. (original) The semiconductor structure of claim 72, wherein the height of the conductive material exceeds the height of the sacrificial material.

76. (original) A semiconductor structure comprising:
a substrate;
a sacrificial material supported on the substrate;
a conductive material supported on the substrate and spaced apart from the sacrificial material;

an overcoat layer overcoating the sacrificial material and the conductive material and extending into the one or more spaces between the sacrificial material and the conductive material,

wherein the sacrificial material has been removed by decomposition through the overcoat layer.

77. (original) The semiconductor structure of claim 76, wherein the sacrificial material is selected from one or more norbornene polymers, polycarbonate polymers, polyester polymers, polyether polymers, methacrylate polymers, acrylate polymers, or mixtures thereof.

78. (original) The semiconductor structure of claim 76, wherein the overcoat material of the overcoat layer completely fills the one or more gaps between the sacrificial material and the conductive material.

79. (original) The semiconductor structure of claim 76, wherein the height of the sacrificial material exceeds the height of the conductive material.

80. (original) The semiconductor structure of claim 76, wherein the height of the conductive material exceeds the height of the sacrificial material.